CKD

SM－419849－A

INSTRUCTION MANUAL

SUPER COMPACT CYLINDER (COIL SCRAPER TYPE：G1) (SPATTER ADHERENCE PREVENTION TYPE：G4)

SSD-G1, G4 SSD-KG1, KG4 Series

- Please read this instruction manual carefully before using this product, particularly the section describing safety.
- Retain this instruction manual with the product for further consultation whenever necessary.

CKD Corporation

The first edition

For Safety Use

To use this product safety, basic knowledge of pneumatic equipment, including materials, piping, electrical system and mechanism, is required (to the level pursuant to JIS B 8370 Pneumatic System Rules).

We do not bear any responsibility for accidents caused by any person without such knowledge or arising from improper operation.

Our customers use this product for a very wide range of applications, and we cannot keep track of all of them. Depending on operating conditions, the product may fail to operate to maximum performance, or cause an accident. Thus, before placing an order, examine whether the product meets your applications, requirements, and how to use it.

This product incorporates many functions and mechanisms to ensure safety. However, improper operation could result in an accident. To prevent such accidents, **read this operation manual carefully for proper operation.**

Observe the cautions on handling described in this manual, as well as the following instructions:

⚠ CAUTION :

- Before performing an overhaul inspection on the actuator, deactivate residual pressure completely.
- While the actuator is operating, do not step into or place hands in the driving mechanism.
- To prevent an electric shock, do not touch the electric wiring connections (exposed live parts) of the actuator equipped with a solenoid valve or switch.
  Perform an overhaul inspection with the power off. Also, do not touch these live parts with wet hands.

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SSD-G1, G4
SSD-KG1,KG4 Series

Super Compact Cylinder
Coil scraper type,
Spatter adherence prevention type
Manual No. SM-419849-A

1. UNPACKING

1) Make sure that the type No. on the nameplate of the delivered Super Compact Cylinder matches the type No. you ordered.
2) Check the appearance for any damage.
3) Stop up the piping port with a sealing plug to prevent the entry of foreign substances into the cylinder. Remove the sealing plug before piping.

2. INSTALLATION

2.1 Installation

1) The ambient temperature for this cylinder is -10 to 60℃. Always operate the cylinder within this temperature range.

2) Install cylinder body with a hexagon socket head cap screw directly.

3) As for the rod nose screw, there are internal thread type and external thread type. Use it to application.

4) Attach a guide so that no lateral load is exerted onto the piston rod.
(Example) Apply no lateral load at all for the purpose of a stopper.

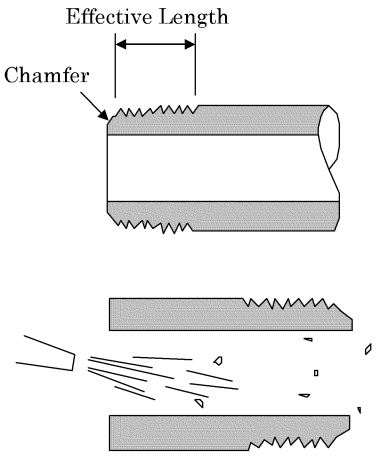
2.2 Piping

1) For piping beyond the filter, use pipes that are tough against corrosion such as galvanized pipes, nylon tubes, rubber tubes, etc.
2) See to it that the pipe connecting cylinder and solenoid valve has effective sectional area which is needed for the cylinder to drive at the specified speed.

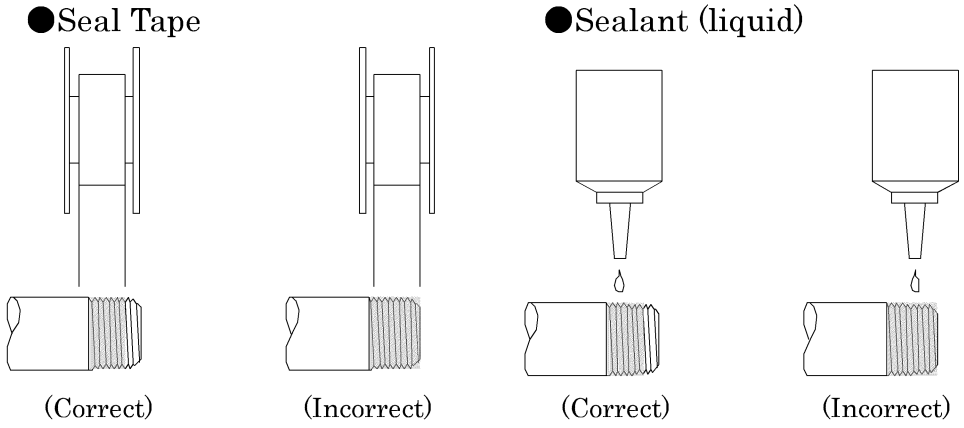
3) Install filter preferably adjacent to the upper-stream to the solenoid valve for eliminating rust, foreign substance in the drain of the pipe.

4) Be sure observe the effective thread length of gas pipe and give a chamfer of approx. 1/2 pitch from the threaded end.

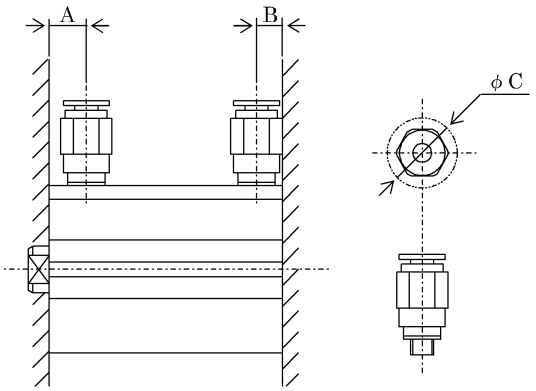
5) Flush air into the pipe to blow out foreign substances and chips before piping.



6) Refrain from applying sealant or sealing tape approx. two pitches of thread off the tip of pipe to avoid residual substances from falling into piping system.



7) Because the usable piping joint has limitations, for using it, see the note below.

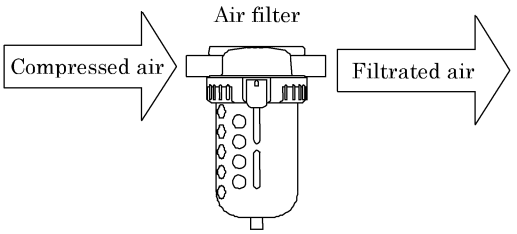


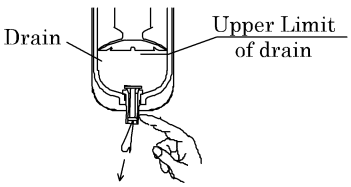
Item / Bore size (mm)	Port diam.	Port dimension A	Port dimension B	Available joints	Joint OD ϕ C	Joint unsuitable
ϕ25	M5×0.8	11	6(11)	SC3W-M5-4, SC3W-M5-6 GWS4-M5-S, GWS4-M5 GWL4-M5, GWL6-M5	ϕ11 or less	GWS6-M5
ϕ32	Rc1/8	8	8(8)	SC3W-6-4・6・8 GWS4-6, GWS6-6, GWS8-6 GWL4-6, GWL6-6	ϕ15 or less	GWS10-6 GWL8-6 GWL10-6
ϕ40		12	8.5(12)			
ϕ50	Rc1/4	10.5	10.5(10.5)	SC3W-8-6・8・10 GWS4-8, GWS6-8, GWS10-8 GWL4 to 12-8	ϕ21 or less	GWS-12-8
ϕ63		13	11(13)			
ϕ80	Rc3/8	16	13(16)	SC3W-10-6・8・10 GWS6-10, GWS8-10, GWS10-10 GWL6 to 12-10		—
ϕ100		23	15(23)			

Note: The values in ( ) show B dimension when overφ25～φ50：150 stroke length andφ63～φ100：200 stroke length.

2.3 Fluid

1) It is necessary to use dehumidified air that has been filtered from compressed air. Carefully select an adequate filter that has an adequate filtration rate (preferably 5 μ m or less), flow rate and its mounting location (as nearest to the directional control valve as possible).





2) Be sure to drain out the accumulation in the filter periodically.

3) Note that the intrusion of carbide for the compressor oil (such as carbon or tarry substance) into the circuit causes malfunction of the solenoid valve and the cylinder. Be sure to carry out thorough inspection and maintenance of the compressor.

4) This cylinder does not require lubrication. It is recommended, however, to use Turbine oil Grade 1, ISO VG32 as a lubricant, if and when lubrication is needed.

2.4 Location of mounting Switches on a Cylinder

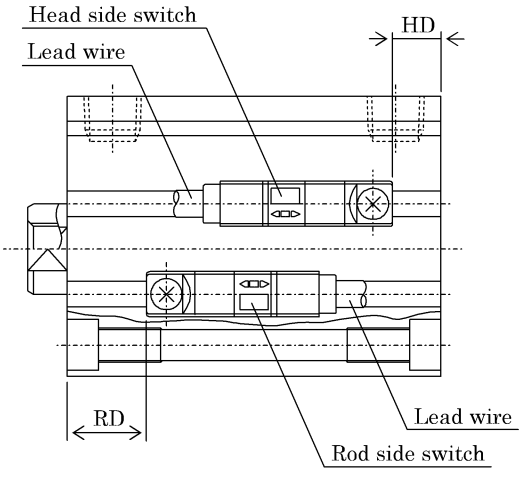
1) Location of mounting switches on a cylinder.

(1) At the stroke end

Refer the illustration above. Mount switches within the rod side dimension RD as well as the head side dimension HD for the purpose of having switches function at the points of the maximum sensitive position.

(2) Intermediate of stroke

Move the piston where it is anticipated to stop and fix it tentatively Slide a switch carefully along the side of cylinder over the piston to find out the spot where switch turns on. This type spot should be located on both side of piston. The intermediate spot between those posits is of the maximum sensitive position and where the switch is supposed to be installed.



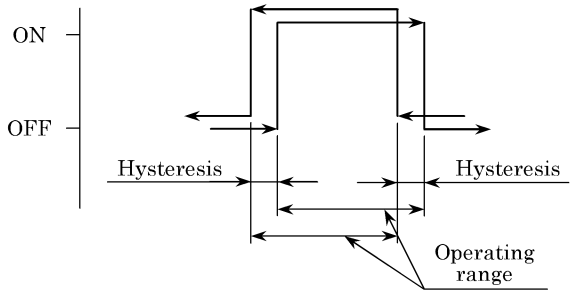
(3) Relocation of switch
Slide switch body along cylinder tube after loosening mounting screws and tighten screws when located the maximum sensitive position.

(4) Replacing switch
Take out switch out of groove after loosening mounting screws. Slide new replacing switch into groove and tighten screws upon placing the switch at the maximum sensitive position. (Apply tightening torque of 0.5 to 0.7N·m)

2) Hysteresis

(1) Precise operating range deviate slightly depending upon the direction of piston movement as shown right.

(2) Switch is apt to be disturbed its accuracy by external effect when piston stops within this range. Carefully avoid designing stopping location of piston.



Maximum sensitive position (HD・RD), Operating range and Hysteresis (Unit:mm)

Item	T2YD / T2YDT							
	SSD-G1L, G4L				SSD-KG1L, KG4L			
Bore size (mm)	Maximum sensitive position		Operating range	Hysteresis	Maximum sensitive position		Operating range	Hysteresis
	HD	RD			HD	RD		
φ25	2.0	20.0	4.5 to 8	1.0 or less	4.5(13)	22.5(27.5)	4.5 to 8	1.0 or less
φ32	4.5	20.5			9.5(17)	25.5(25.5)		
φ40	8.0	23.5	5 to 8.5		10.5(20)	31(31)	5 to 8.5	
φ50	9.0		5.5 to 9.5		11.5(20.5)	31(36)	5.5 to 9.5	
φ63	13.0	24.0			18(23.5)	29(34)		
φ80	19.0	26.5	6 to 10		24(29.5)	31.5(36.5)	6 to 10	
φ100	24.5	30.5			29.5(35)	35.5(40.5)		

※ Switches at ex-factory shipment are positioned at the maximum sensitive position (HD and RD).
Note1: HD and RD for five strokes may vary from those stated in the above table since they are set every time the cylinder is installed.
Note2: The values in ( ) show HD,RD dimensions when overφ25～φ50:150 stroke length andφ63～φ100:200 stroke length.

3. OPERATION

3.1 Operating the Cylinder

1) The working pressure for this type of cylinder is specified in "Product Specifications". Operate the system within this range.

2) Install an external stopper when the dynamic energy is large, as it does not absorb the kinetic energy since it has no cushion.

3) Install an appropriate speed controller to adjust the working piston speed.

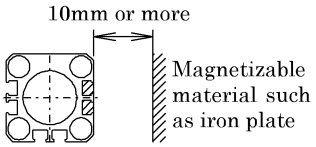
3.2 How to use the Switches

3.2.1 Common items

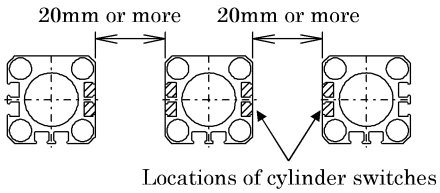
1) Magnetic environment
Do not operate this product in a place where a strong magnetic field or large current (large magnet or spot welder, etc.) exists. If a cylinder with the switch is installed in parallel to this product or the magnetic substance moves near the cylinder, the mutual interference may occur and affect the detection accuracy.

2) Protection of lead cord
Pay consideration to eliminate repeating bending stress or stretching of lead cord while laying the cord.
To the moving portion, use such cord of flexibility as for building a robot.

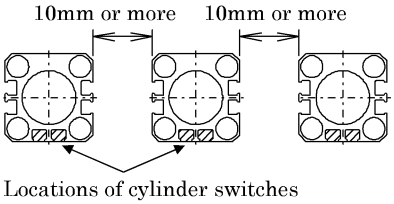
3) Operating temperature
Do not operate the product at a high temperature (60℃)
Always avoid operation of the product in a hot place due to temperature characteristics of magnetic and electronics parts.



4) Intermediate position detection
When activating the switch halfway of the stroke, the relay may not respond if the piston speed is too fast.
(Example) Operate cylinder with the speed of less than 500mm/s in case the relay actuation time is 20ms.



5) Shock resistance
Do not apply a large vibration or impact to the product when transporting the cylinder, or mounting or adjusting the switch.



6) Magnetizable material such as ironplate near by cylinder switch is apt to cause malfunction of cylinder switches. Keep it from cylinder surface at least10mm away (This is applicable for all bore sizes of tube).
7) It usually causes malfunction cylinder switches when plural cylinders are laid adjoining. Keep a space between each other as illustrated to right (This is applicable for all bore sizes of tube).

3.2.2 Operational Cautions, Solid state switch (T2YD, T2YDT)

1) Connection of lead cord

Comply with the color coding specified on the illustrations. Be sure to turn the power off before starting connecting work.

An erroneous wiring or short circuiting of load causes damage to not only switches, but also load side circuit. Wiring work without shutting electricity off may cause damage to the load side circuit.

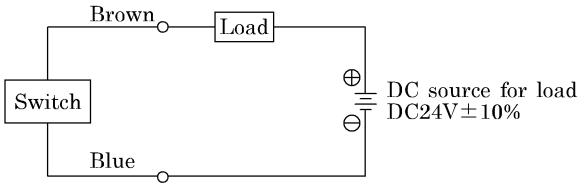


Fig.1 T2YD(T) Fundamental circuit Example

2) Protection of output circuit

Install some protective circuit as illustrated in Fig. 2 or 3 (in case of model T2YD(T)).

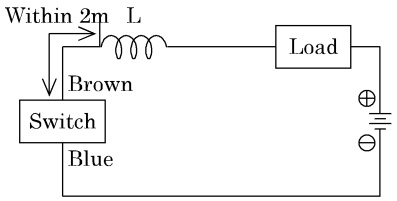


Fig.2 ・Choke coil
L= a couple hundred μ H to a couple mH surpassing high frequency characteristic
・Install it near by a switch (within 2m).

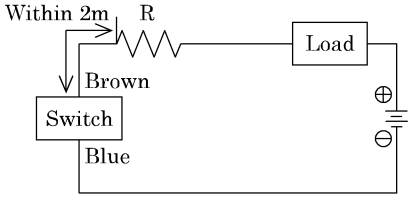


Fig.3 ・Dash current restriction resister.
R=As much large resister as the load circuit can afford.
・Install it near by a switch (within 2m).

3) Connection to a programmable controller (Sequencer).
Type of connection varies depending upon the model of the programmable controller. Refer to the following Fig. 4 to 6 respectively.

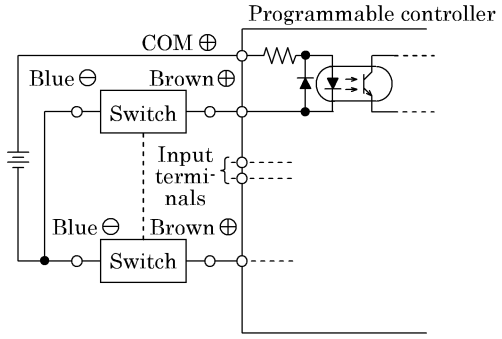


Fig.4 An example of T2YD(T) connection to source input type (an external power source)

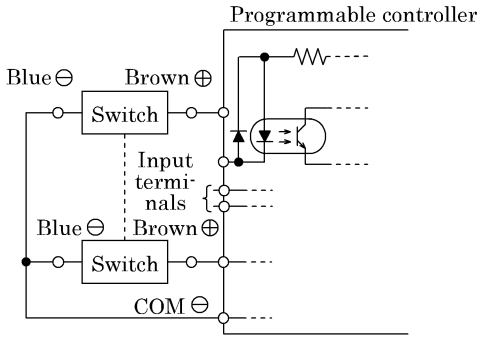


Fig5 An example of T2YD(T) connection to source input type (an internal power source)

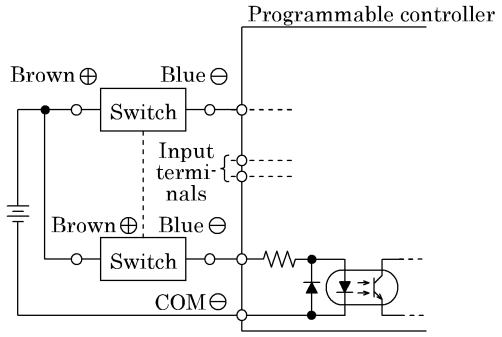


Fig.6 An example of T2YD(T) connection to sink input type

4) Series connection
The total voltage will decrease when the T2YD(T) switches connections have a leak. Therefore, confirm the input specifications for the programmable controllers, which are the connecting load. However, dimming or total failure of the indicator light may exist.

5) Serial connection
When two or more T2YD(T) switches are connected in series, the voltage drop is equal to the sum of the voltage drops in all of the connected switches. The voltage applied to the load is the result of subtracting the total voltage drop from the power source voltage. It is necessary to determine the number of switches to be connected based on the specifications of the load.
The indicator light turns ON only when all switches are ON.

4. MAINTENANCE

4.1 Periodical Inspection

1) In order to upkeep the cylinder in optimum condition, carry out periodic inspection once or twice a year.
2) Inspection items
   (1) Check the bolts and nuts fitting the piston rod end brackets and mounting brackets for slackening.
   (2) Check to see that the cylinder operates smoothly.
   (3) Check any change of the piston speed and cycle time.
   (4) Check for internal and/or external leakage.
   (5) Check the piston rod for flaw (scratch) and deformation.
   (6) Check the stroke for abnormality.

   See "Trouble shooting", 5 should there be any trouble found, also carry out additional tightening if bolts, nuts, etc. are slackened.

4.2 Disassembly

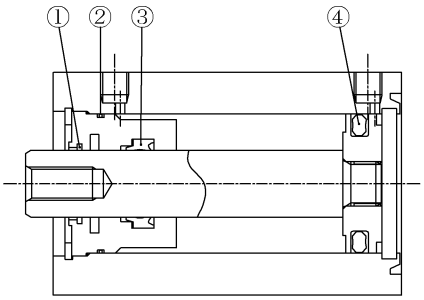
1) This cylinder is able to be disassembled.
   Replace component parts listed in Expendable parts List by disassembling cylinder referring to internal structure diagram when air leakage is ever occurred.
2) Remove piston rod and rod metal after removing C shape snap ring for the purpose of disassembly.

4.3 Assembly

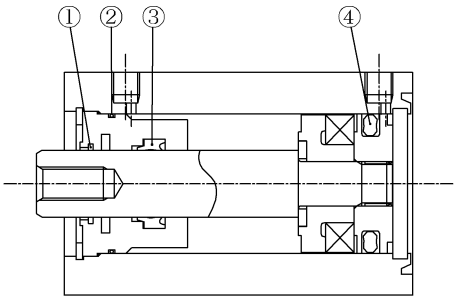
1) Clean each component parts.
2) Take reversed sequence of disassembly to assemble cylinder after cleaning parts. Carefully avoid giving damage to packings to prevent malfunction or air leakage.
3) Apply a film of high grade grease (Litium alkali base) over the inner surface of cylinder tube, outer surface of piston and packings.

4.4 Internal structure drawings and Expendable parts list

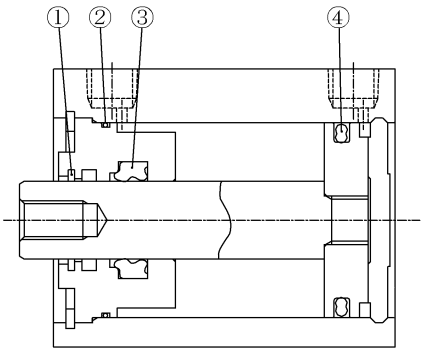
● SSD - G1/G4 - φ 25
(Double acting・Spatter adherence prevention type)



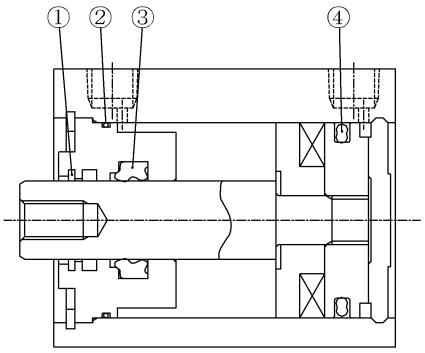
● SSD - G1L/G4L - φ 25
(Double acting・Spatter adherence prevention type・With switch)



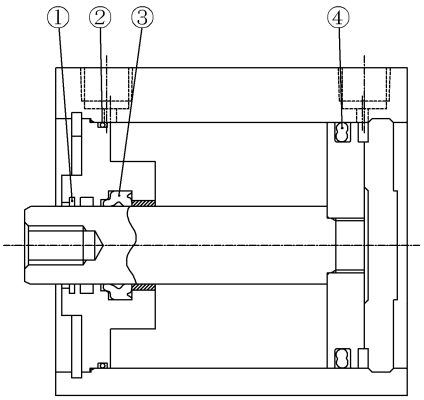
● SSD - G1/G4 - φ 32～ φ 50
(Double acting・Spatter adherence prevention type)



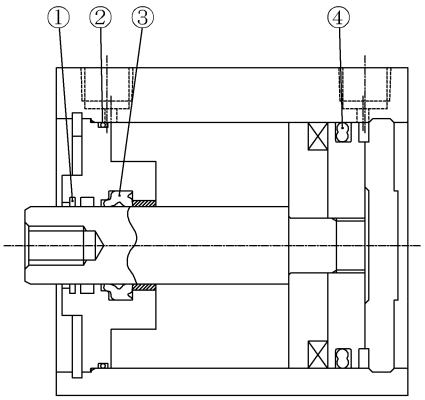
● SSD - G1L/G4L - φ 32～ φ 50
(Double acting・Spatter adherence prevention type・With switch)



● SSD - G1/G4 - φ 63～ φ 100
(Double acting・Spatter adherence prevention type)



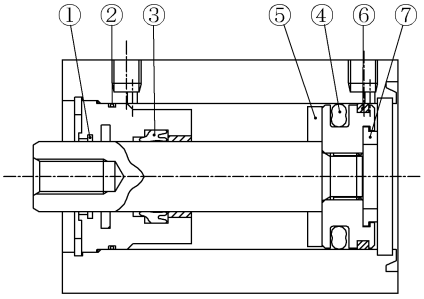
● SSD - G1L/G4L— φ 63～ φ 100
(Double acting・Spatter adherence prevention type・With switch)



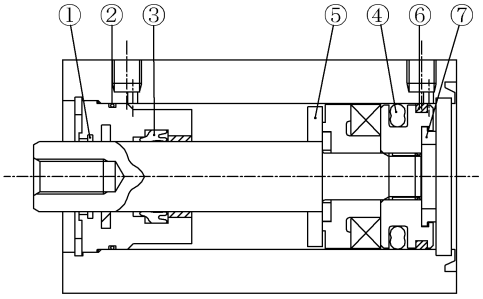
Expendable parts list (Specify the kit No. on your purchase order.)

Bore size (mm) / Parts name / Kit No. / Parts No.		①	②	③	④
		Coil scraper	Rod metal gasket	Rod packing	Piston packing
ϕ 25	SSD-G1-25K				
ϕ 32	SSD-G1-32K				
ϕ 40	SSD-G1-40K				
ϕ 50	SSD-G1-50K				
ϕ 63	SSD-G1-63K				
ϕ 80	SSD-G1-80K				
ϕ 100	SSD-G1-100K				

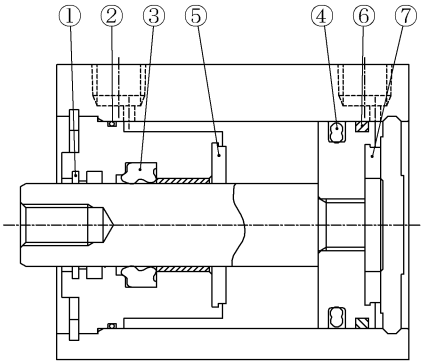
● SSD - KG1/KG4 - φ 25
(Double acting･High load･Spatter adherence prevention type)



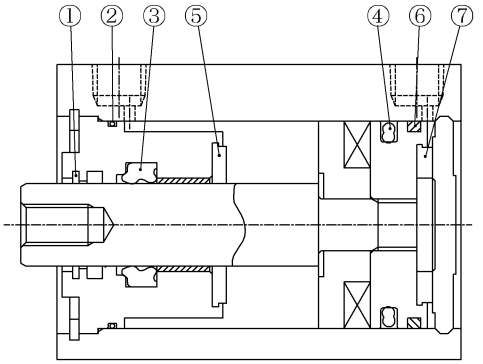
● SSD - KG1L/KG4L - φ 25
(Double acting･High load･
Spatter adherence prevention type･With switch)



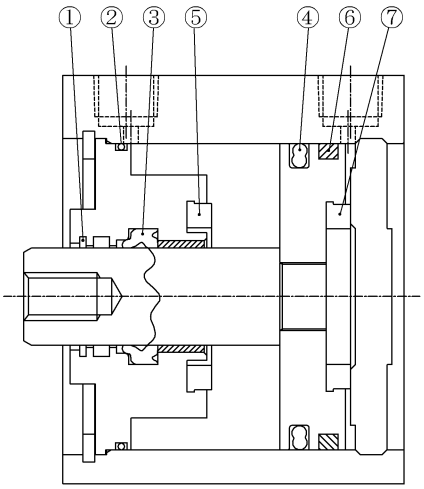
● SSD - KG1/KG4 - φ 32～ φ 50
(Double acting･High load･Spatter adherence prevention type)



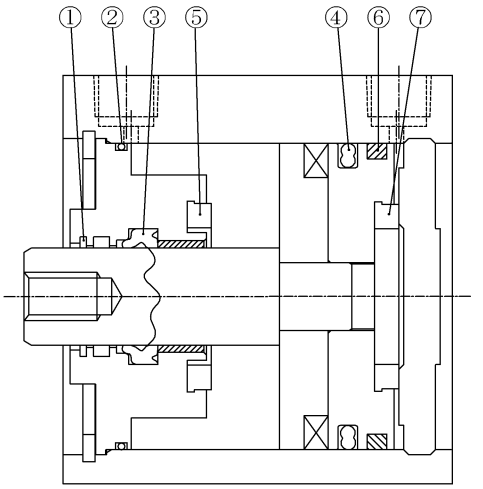
● SSD - KG1L/KG4L - φ 32～ φ 50
(Double acting･High load･
Spatter adherence prevention type･With switch)



● SSD - KG1/KG4 - φ 63～ φ 100
(Double acting･High load･Spatter adherence prevention type)



● SSD - KG1L/KG4L - φ 63～ φ 100
(Double acting･High load･
Spatter adherence prevention type･With switch)



Expendable parts list (Specify the kit No. on your purchase order.)

Parts No. / Parts name / Bore size (mm) / Kit No.	①	②	③	④
ϕ 25	SSD-KG1-25K	Coil scraper	Rod metal gasket	Rod packing	Piston packing
ϕ 32	SSD-KG1-32K				
ϕ 40	SSD-KG1-40K				
ϕ 50	SSD-KG1-50K				
ϕ 63	SSD-KG1-63K				
ϕ 80	SSD-KG1-80K				
ϕ 100	SSD-KG1-100K				

Parts No. / Parts name / Bore size (mm) / Kit No.	⑤	⑥	⑦
ϕ 25	SSD-KG1-25K	Cushion rubber(R)	Wear ring	Cushion rubber(H)
ϕ 32	SSD-KG1-32K			
ϕ 40	SSD-KG1-40K			
ϕ 50	SSD-KG1-50K			
ϕ 63	SSD-KG1-63K			
ϕ 80	SSD-KG1-80K			
ϕ 100	SSD-KG1-100K			

5. TROUBLE SHOOTING

1) Cylinder

Trouble	Causes	Remedies
Does not operate.	No pressure or inadequate pressure.	Provide an adequate pressure source.
	Signal is not transmitted to direction control valve.	Correct the control circuit.
	Improper or misalignment of installation.	Correct the installation state and/or change the mounting style.
	Broken piston packing	Replace the piston packing.
Does not function smoothly.	Speed is below the low speed limit	Limit the load variation.
	Improper or misalignment of installation.	Correct the installation state and/or change the mounting style.
	Exertion of transverse (lateral) load.	Install a guide. Revise the installation state and/or change the mounting style.
	Excessive load.	Increase the pressure itself and/or the inner diameter of the tube.
	Speed control valve is built in the way of "Meter in" circuit.	Change the meter-out circuit of the speed control valve.
Breakage and / or deformation	Impact force due to high speed operation	
	Exertion of transverse load.	Install a guide. Reverse the installation state and/or change the mounting style.

2) Switch

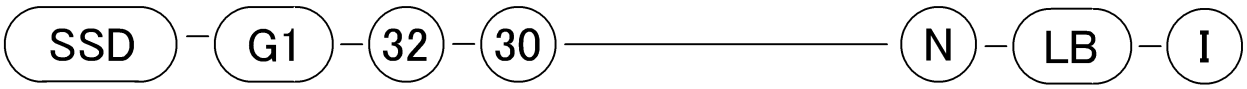
Troubles	Causes	Remedies
Indicator light is not lit	Deposited contact point	Replace the switch.
	Excessive load than rated capacity	Replace the relay with a recommended one or replace the switch.
	Damaged indicator light	Replace the switch.
	Inadequate incoming signal	Review the external signal circuit and remove the causes.
Switch does not function right.	Broken circuit	Replace the switch.
	Inadequate incoming signal	Review the external signal circuit and remove the causes.
	Improper voltage	Correct voltage to specified.
	Incorrect location of switch	Correct its location.
	Aberrant position of switch	Set it back to original position and tighten the mounting device.
	Incorrect direction of switch mounting	Correct the direction of the switch mounting.
	Relay is unable to respond properly	Turn the speed down. Replace the relay with a recommended one.
	Excessive load than rated capacity	Replace the relay with a recommended one or replace the switch.
Switch does not return.	Piston is not moving	Make the piston move.
	Deposited contact point	Replace the switch
	Excessive load (relay) than rated capacity	Replace the relay with a recommended one or replace the switch.
	The ambient temperature is out of the specification range	Adjust the ambient temperature within the range of -10 to 60℃
	Existence of a foreign magnetic field	Shield the magnetic field.
	Inadequate incoming signal	Review the external signal circuit and remove the causes.

6. HOW TO ORDER

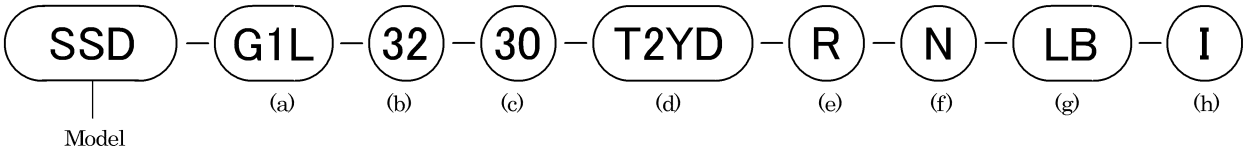
6.1 Product Number Coding

(1) Double acting・Coil scraper type:G1, Spatter adherence prevention type:G4

● Without switch



● With switch



(a) Degree of protection level		(b) Bore size (mm)		(c) Stroke (mm)	
G1	Coil scraper type	25	φ25	φ25～φ50	φ63～φ100
G4	Spatter adherence prevention type	32	φ32	5	5
G1L	Coil scraper type with switch	40	φ40	10	10
G4L	Spatter adherence prevention type With switch	50	φ50	15	20
		63	φ63	20	30
		80	φ80	25	40
		100	φ100	30	50
				40	
				50	

(d) Switch model No.				(e) Qty. of switch		(f) Option	
Lead wire straight type	Con tact	Indication	Lead wire	R	Rod side, 1 ea.	No code	Rod end female thread
T2YD※	Proxi mity	Strong magnetic field proof switch	2-wire	H	Head side, 1 ea.	N	Rod end male thread
T2YDT※				D	2 ea.		

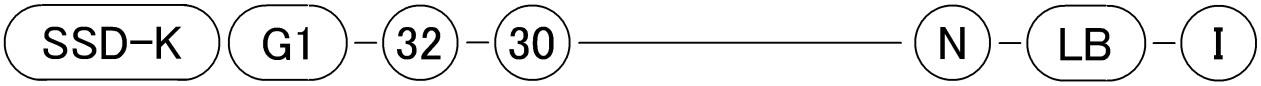
※mark indicates the length of lead wire.

(g) Mounting bracket		(h) Accessory (permissible if rod end male thread "N" was selected)	
LB	Axial foot	I	Rod eye
LB2	Axial foot (compact type)	I2	Rod eye (compact type)
CB	Clevis (pin and snap ring attached)	Y	Rod clevis (pin and snap ring attached)
CB2	Clevis (compact type) (pin and snap ring attached)	Y2	Rod clevis (compact type) (pin and snap ring attached)
FA	Rod end flange type		
FB	Head end flange type		

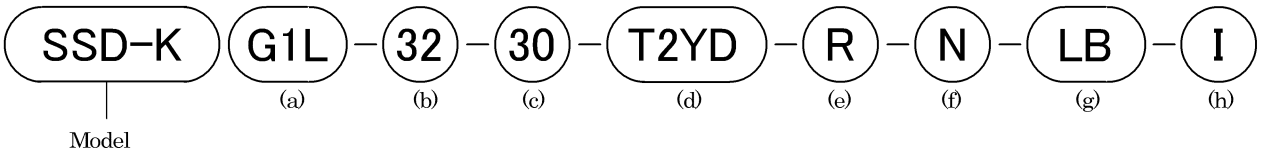
※ Lead wire length	
No code	1m (Standard)
3	3m (Optional)
5	5m (Optional)

(2) Double acting・High load・Coil scraper type:G1, Spatter adherence prevention type:G4

● Without switch



● With switch



(a) Degree of protection level		(b) Bore size (mm)		(c) Stroke (mm)	
G1	Coil scraper type	25	φ25	φ25～φ50	φ63～φ100
G4	Spatter adherence prevention type	32	φ32	10	10
G1L	Coil scraper type with switch	40	φ40	15	—
G4L	Spatter adherence prevention type With switch	50	φ50	20	20
		63	φ63	25	—
		80	φ80	30	30
		100	φ100	40	40
				50	50
				60	60
				70	70
				80	80
				90	90
				100	100

(d) Switch model No.				(e) Qty. of switch		(f) Option	
Lead wire straight type	Con tact	Indication	Lead wire	R	Rod side, 1 ea.	No code	Rod end female thread
T2YD※	Proxi mity	Strong magnetic field proof switch	2-wire	H	Head side, 1 ea.	N	Rod end male thread
T2YDT※				D	2 ea.		

※mark indicates the length of lead wire.

(g) Mounting bracket		(h) Accessory (permissible if rod end male thread "N" was selected)	
LB	Axial foot	I	Rod eye
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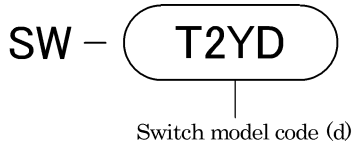
CB	Clevis (pin and snap ring attached)	Y	Rod clevis (pin and snap ring attached)
CB2	Clevis (compact type) (pin and snap ring attached)	Y2	Rod clevis (compact type) (pin and snap ring attached)
FA	Rod end flange type		
FB	Head end flange type		

※ Lead wire length	
No code	1m (Standard)
3	3m (Optional)
5	5m (Optional)

6.2 Component parts Model coding

● Switch main body only



7. SPECIFICATION

7.1 Product Specifications

Model / Item		SSD-G1・G4 SSD-G1L・G4L (With switch)						
Bore size	mm	ϕ 25	ϕ 32	ϕ 40	ϕ 50	ϕ 63	ϕ 80	ϕ 100
Actuation		Double acting						
Working fluid		Compressed Air						
Max. working pressure	MPa	1.0						
Min. working pressure	MPa	0.15				0.1		
Proof pressure	MPa	1.6						
Ambient temperature	℃	-10 to 60 (No freezing)						
Port size		M5	Rc1/8		Rc1/4		Rc3/8	
Stroke tolerance	mm	+1.0 0						
Working piston speed	mm/s	50 to 500				50 to 300		
Cushion		Without Cushion						
Lubrication		Not required (Use Grade 1 ISO VG 32 Turbine oil, if lubrication is preferred)						
Allowable energy absorption	J	0.021	0.025	0.092	0.1	0.12	0.27	0.56

Model / Item		SSD-KG1・KG4 SSD-KG1L・KG4L (With switch)						
Bore size	mm	ϕ 25	ϕ 32	ϕ 40	ϕ 50	ϕ 63	ϕ 80	ϕ 100
Actuation		Double acting・High load						
Working fluid		Compressed Air						
Max. working pressure	MPa	1.0						
Min. working pressure	MPa	0.15				0.1		
Proof pressure	MPa	1.6						
Ambient temperature	℃	-10 to 60 (No freezing)						
Port size		M5	Rc1/8		Rc1/4		Rc3/8	
Stroke tolerance	mm	+2.0 0						
Working piston speed	mm/s	50 to 500				50 to 300		
Cushion		Rubber cushion						
Lubrication		Not required (Use Grade 1 ISO VG 32 Turbine oil, if lubrication is preferred)						
Allowable energy absorption	J	0.157	0.402	0.628	0.98	1.56	2.51	3.92

7.2 Switch Specification

Type & Model / Item	Solid state 2 wire	
	T2YD	T2YDT
Applications	Programmable controller	
Load voltage	DC24V±10%	
Load current	5 to 20mA	
Internal voltage drop	6V or less	
Indicator light	Red/green LED (ON lighting)	
Leakage current	1.0mA or less	
Output delay time (Note3) (ON delay, OFF delay)	30 to 60ms	
Lead wire length (Note1)	Standard 1m (Oil resistant vinyl cabtire cord 2 conductor 0.5mm)	Standard 1m (Flame resistant vinyl cabtire cord 2 conductor 0.5mm)
Shock resistance	980m/s²	
Insulation resistance	100MΩ over at DC500V megger	
Withstand voltage	No failure impressed at AC1000V for one minute	
Ambient temperature	−10 to 60℃	
Degree of protection	IEC Standards IP67, JIS C0920 (water tight type), oil resistance	

Note1：3m or 5m long lead wire is optionally available.